CLAIMS

WE CLAIM:

1. A fluidic pulse generator system for directing a flow of a pressurized fluid, comprising:

a fluidic pilot valve including an inlet nozzle, first and second control ports, and first and second outlet ports, the fluidic pilot valve inlet nozzle adapted to receive the flow of pressurized fluid, and the fluidic pilot valve first and second control ports each adapted to selectively receive a flow of control fluid, the fluidic pilot valve configured, in response to the selective receipt of the flow of control fluid to the fluidic pilot valve first or second control ports, to direct the flow of pressurized fluid received by the fluidic pilot valve inlet nozzle through the fluidic pilot valve second or first outlet port, respectively;

a first fluidic diverter valve including an inlet nozzle, first and second control ports, and first and second outlet ports, the first fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the first fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the first fluidic diverter valve inlet nozzle through the first fluidic diverter valve first or second outlet ports, respectively; and

a second fluidic diverter valve including an inlet nozzle, first and second control ports, and first and second outlet ports, the second fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the second fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the second fluidic diverter valve inlet nozzle through the second fluidic diverter valve second or first outlet ports, respectively.

2. The system of Claim 1, further comprising:

a control valve including an inlet port, and first and second outlet ports in fluid communication with the inlet port, the inlet port adapted to receive the flow of pressurized fluid, the first and second outlet ports in fluid communication with the pilot valve first and second control ports, respectively; and

a valve element mounted on the control valve and moveable between a first position, in which the flow of pressurized fluid received by the inlet port is directed out the first outlet port as control fluid, and a second position, in which the flow of pressurized fluid received by the inlet port is directed out the second outlet port as control fluid,

whereby the control valve, in response to movement of the valve element between the first and second positions, selectively directs the flow of control fluid to the fluidic pilot valve first and second control ports, respectively.

3. The system of Claim 2, further comprising:

a torque motor coupled to the valve element, the torque motor adapted to receive one or more valve position command signals and operable, in response thereto, to move the valve element to either the first or second position.

4. The system of Claim 3, further comprising:

a control circuit configured to supply the valve position command signals.

5. The system of Claim 4, wherein the control circuit is further configured to supply the valve position command signals at a predetermined rate, to thereby move the valve element between the first and second positions at the predetermined rate.

6. The system of Claim 1, further comprising:

a plurality of distribution ducts, each distribution duct in fluid communication with one of the first or second fluidic diverter valve outlet ports.

7. The system of Claim 6, further comprising:

one or more flow restrictions disposed within each of the distribution ducts.

8. The system of Claim 6, wherein:

each distribution duct includes an outlet port; and

each distribution duct outlet port is configured to shape the flow of pressurized fluid therethrough.

9. The system of Claim 1, wherein:

each of the inlet nozzles includes an expansion section having a predetermined length; and

the predetermined length of the fluidic pilot valve nozzle expansion section is greater than the predetermined length of the first and second fluidic diverter valve inlet nozzle expansion sections.

10. The system of Claim 1, further comprising:

an inlet duct having an inlet port configured to receive the flow of pressurized fluid, and an outlet port in fluid communication with the fluidic pilot valve inlet nozzle, to thereby direct the flow of pressurized fluid thereto; and

a shut-off valve mounted on the inlet duct, the shut-off valve moveable between at least a closed position, in which the flow of pressurized fluid to the fluidic pilot valve inlet nozzle is prevented, and an open position, in which the flow of pressurized fluid to the fluidic pilot valve inlet nozzle is allowed.

11. A fluidic pulse generator system for directing a flow of a pressurized fluid, comprising:

a fluidic pilot valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the fluidic pilot valve inlet nozzle adapted to receive the flow of pressurized fluid, and the fluidic pilot valve first and second control ports each adapted to selectively receive a flow of control fluid, the fluidic pilot valve configured, in response to the selective receipt of the flow of control fluid to the fluidic pilot valve first or second control ports, to direct the flow of pressurized fluid received by the fluidic pilot valve inlet nozzle through the fluidic pilot valve second or first outlet port, respectively;

a first fluidic diverter valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the first fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the first fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the first fluidic diverter valve inlet nozzle through the first fluidic diverter valve first or second outlet ports, respectively;

a second fluidic diverter valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the second fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the second fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the second fluidic diverter valve inlet nozzle through the second fluidic diverter valve second or first outlet ports, respectively;

a control valve having an inlet port, and first and second outlet ports in fluid communication with the inlet port, the inlet port adapted to receive the flow of pressurized fluid, the first and second outlet ports in fluid communication with the pilot valve first and second control ports, respectively; and

a valve element mounted at least partially within the valve body and moveable between a first position, in which the flow of pressurized fluid received by the inlet port is directed out the first outlet port as control fluid, and a second position, in which the flow of pressurized fluid received by the inlet port is directed out the second outlet port as control fluid,

whereby the control valve, in response to movement of the valve element between the first and second positions, selectively directs the flow of control fluid to the fluidic pilot valve first and second control ports, respectively.

12. The system of Claim 11, further comprising:

a torque motor coupled to the valve element, the torque motor adapted to receive one or more valve position command signals and operable, in response thereto, to move the valve element to either the first or second position.

13. The system of Claim 12, further comprising:

a control circuit configured to supply the valve position command signals.

14. The system of Claim 13, wherein the control circuit is further configured to supply the valve position command signals at a predetermined rate, to thereby move the valve element between the first and second positions at the predetermined rate.

15. The system of Claim 11, further comprising:

a plurality of distribution ducts, each distribution duct in fluid communication with one of the first or second fluidic diverter valve outlet ports.

16. The system of Claim 15, further comprising:

one or more flow restrictions disposed within each of the distribution ducts.

17. The system of Claim 15, wherein:

each distribution duct includes an outlet port; and

each distribution duct outlet port is configured to shape the flow of pressurized fluid therethrough.

18. The system of Claim 11, wherein:

each of the inlet nozzles includes an expansion section having a predetermined length; and

the predetermined length of the fluidic pilot valve nozzle expansion section is greater than or equal to the predetermined length of the first and second fluidic diverter valve inlet nozzle expansion sections.

19. The system of Claim 11, further comprising:

an inlet duct having an inlet port configured to receive the flow of pressurized fluid, and an outlet port in fluid communication with the fluidic pilot valve inlet nozzle, to thereby direct the flow of pressurized fluid thereto; and

a shut-off valve mounted on the inlet duct, the shut-off valve moveable between at least a closed position, in which the flow of pressurized fluid to the fluidic pilot valve inlet nozzle is prevented, and an open position, in which the flow of pressurized fluid to the fluidic pilot valve inlet nozzle is allowed.

20. A fluidic pulse generator system supplying periodic fluid pressure pulses, comprising:

a control circuit configured to supply the valve position command signals at a predetermined rate;

a fluidic pilot valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the fluidic pilot valve inlet nozzle adapted to receive the flow of pressurized fluid, and the fluidic pilot valve first and second control ports each adapted to selectively receive a flow of control fluid, the fluidic pilot valve configured, in response to the selective receipt of the flow of control fluid to the fluidic pilot valve first or second control ports, to direct the flow of pressurized fluid received by the fluidic pilot valve inlet nozzle through the fluidic pilot valve second or first outlet port, respectively;

a first fluidic diverter valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the first fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the first fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the first fluidic diverter valve inlet nozzle through the first fluidic diverter valve first or second outlet ports, respectively;

a second fluidic diverter valve having an inlet nozzle, first and second control ports, and first and second outlet ports, the second fluidic diverter valve inlet nozzle adapted to receive the flow of pressurized fluid, the second fluidic diverter valve first and second control ports in fluid communication with the fluidic pilot valve second and first outlet ports, respectively, whereby pressurized fluid flow through the fluidic pilot valve first or second outlet ports directs the flow of pressurized fluid received by the second fluidic diverter valve inlet nozzle through the second fluidic diverter valve second or first outlet ports, respectively;

a control valve having an inlet port, and first and second outlet ports in fluid communication with the inlet port, the inlet port adapted to receive the flow

of pressurized fluid, the first and second outlet ports in fluid communication with the pilot valve first and second control ports, respectively;

a valve element mounted at least partially within the valve body and moveable between a first position, in which the flow of pressurized fluid received by the inlet port is directed out the first outlet port as control fluid, and a second position, in which the flow of pressurized fluid received by the inlet port is directed out the second outlet port as control fluid; and

a torque motor coupled to the valve element, the torque motor coupled to receive the position command signals and operable, in response thereto, to move the valve element to between the first and second positions at the predetermined rate,

whereby the control valve, in response to movement of the valve element between the first and second positions at the predetermined rate, selectively directs the flow of control fluid to the fluidic pilot valve first and second control ports, respectively, at the predetermined rate.